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ROCKS AND MINERALS

A Magazine For Mineralogist, Geologist & Collector

OFFICIAL JOURNAL OF

THE ROCKS AND MINERALS ASSOCIATION

PUBLISHED MONTHLY

OCTOBER, 1934

THE BULLETIN BOARD

Constructive Criticism Wanted

The Editor of ROCKS and MINERALS is always glad to receive criticisms of the magazine and suggestions for its improvement but when a criticism is mailed to him he would appreciate the suggestion of something constructive to take its place; otherwise he might if he followed criticisms of some of the Departments, find himself in the position of the country editor who announced in an issue that he would publish in the following week a paper that would have nothing in it objectionable to any of its readers if each one would inform him as to the Department which could well be omitted. The letters came in and on the day of going to press only the headline of the paper remained upon the imposing stone. They were about to lock up the form when his wife came in. She said, "My dear, you certainly aren't going to use that old head, are you?"

"Bill," said the editor turning to the foreman, "take out the head and go to press."

We may not always accept the advice given us nor adopt every suggestion. But they are all duly considered and have not a little weight in the planning of our monthly issues.

ROCKS AND MINERALS CLUB, NEVADA BRANCH

Congregating, as people with the same interests do, several mineralogy-minded men and women met at the home of Mrs. Rader L. Thompson, of Reno, Nevada, one evening in the first week of May And there were welded into one, the Nevada Branch of the Rocks and Minerals Club.

This club was organized with twelve regular, and four honorary members. At that time the following officers were elected:

Mrs. Rader L. Thompson, President; Prof. Vincent P. Gianella, Instructor; Prof. Walter S. Palmer, Assistant Instructor; Thomas E. Moltzen, Vice-President; John Brockman, Secretary-Treasurer; Fred C. Greulich, Publicity; and Mrs. William Smythe, Auditor.

President Clark, of the Mackey School of Mines, gave them permission to meet in one of the lecture rooms with laboratory equipment, where they are using lessons prepared by Prof. Gianella, Professor of Geology and Mineralogy at the University of Nevada, rather than the National lessons, although it may be necessary to change in the future.

The club meets the first and third Wednesday of each month and dues are fifty cents a month. One field trip was held on July 1st, when fourteen members of the club went to the summit of the Sierras to have lunch and a lecture.

The club expects to be enlarged by a number of prospective members who are waiting for the cooler weather before taking part.

WANTED: Correspondents in all parts of the world who will be kind enough to send us notes and news items on minerals, that they think may be interesting to the subscribers of ROCKS and MINERALS. Such as are available we shall be very glad to print in the magazine.

ROCKS and MINERALS

A MAGAZINE FOR MINERALOGIST, GEOLOGIST AND COLLECTOR

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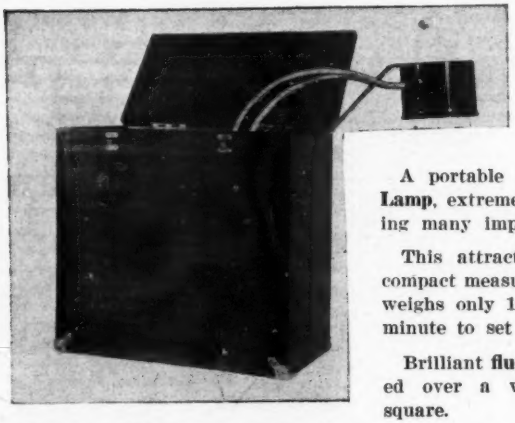

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4. No specimens will be returned. This feature is for your convenience only, so do not put us to the trouble of repacking and remailing specimens.
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Edited and Published by Peter Zodac

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OCTOBER 1934

VOL. 9, No. 10

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Digging for Opals in Virgin Valley

By ARTHUR MONTGOMERY

It may seem superfluous to add another article on a subject already covered so adequately in the March, 1933, issue of ROCKS and MINERALS. Still, practice never proves to be quite what one may expect from theory, and this seems to be particularly true when one is prospecting for opal. Some recollections of a summer spent in that unique hunting-ground for opals, Virgin Valley, Nevada, may serve to prove my point, while, at the same time, indicating between the lines what one may expect who goes out there.

A party of us camped in Virgin Valley for two months of last summer (the two hottest months, I may add), hoping to work successfully several of the better-known claims. I add also that we worked in co-operation with the owner of 'said' claims. Those who are familiar with Virgin Valley know that the term, 'high-grading,' enjoys considerable vogue in those parts. I don't doubt myself that it was our failure to live up to the best traditions of the valley that made us so unlucky.

Let me say now that the enthusiastic expectation of those who approach Virgin Valley is fed upon truly magnificent tales of what to expect when you get there. The precious opal lies about so thickly that you will be forever stubbing your toe on some of it. And it will help to wear dark glasses when prospecting, not because of the sun but because the intense brilliance of the gems almost blinds the eye. Yet these are nothing compared to the 'true stories' told in the valley proper. You cannot help concluding that in the old days the walls of the valley resounded continuously to gun-fire between rival factions of high-graders. There roamed about such legendary figures as Opal Shorty, a dwarfish outlaw who yet walked with tremendous strides and thought nothing of starting out on foot for Alturas, seventy miles away. Opals weighing twenty pounds were found and had to be carted off in wagons, and somewhere still in the valley there is the treasure-cache of O'Brien, who died later beside a poisoned spring in a manner befitting those who must 'tell no tales.' Perhaps the best story of all concerns that 'green' prospector who arrived in the valley one day with the usual equipment plus a huge ladle. When asked what the ladle was for, he replied that in Alturas they had told him he would need it to pluck the opals out of boiling-hot springs! But enough of legends.

My partner and I were to work together under the direct supervision of the owner of the claims. The latter, well along in years, was supposed to know more about finding opal than all the current legends put together. This knowledge was also legendary so far as we were concerned, and as evidenced by the ultimate results. We would be told where to dig and how to dig; we would apply the well-known 'elbow-grease'; that was all there was to it. The precious opal was there just wait-

ing for us to dig it out. How could we fail!

So it happened that one pleasant June morning saw my partner and me setting to work with a will upon a claim said to have produced many wonderful black gems in the past. The sun was beating down in a friendly way at a temperature of 120 degrees more or less. At frequent intervals a cooling breeze would relieve the temperature somewhat, but what it was really there for was to blow clouds of finely-disseminated volcanic ash into our unprotected faces. To lessen the monotony of the work now and then, we could treat ourselves to the exquisite panorama which stretched away from the base of the high hillside upon which we were perched, a monotonous sweep of ugly, lava-capped tablelands whose slopes conformed either to the mud-gray color of omnipresent volcanic ash or were covered sparsely with boulders of black, basaltic lava. No vegetation was in sight; nothing to relieve an utterly featureless landscape baking under the intense glare of desert sun.

Our manner of digging deserves a separate paragraph. The oft-pictured method of chipping away with a hammer to get at the hidden gems has little foundation out here. Part of the time you wield a pick like a madman; the rest of the time you shovel the fruits of the first occupation into a wheelbarrow and succeed after a titanic effort in dumping the cursed stuff down the hillside. This is called 'mucking,' and the name just about fits the character of the work. The opals could not have chosen a more suitable hiding-place than these beds of gray, solidified volcanic ash. It is surprisingly hard, and when it does yield finally to the pick, breaks off in small fragments. You must strike a mighty blow to achieve the smallest results. Once in a very great while

Courtesy U. S. Geological Survey.

Opal Mining, Virgin Valley, Nevada.

the pick encounters something solid. It the sound is metallic you have struck a rock, and a few well-timed oaths are not out of place. But if the sound is like breaking glass everybody yells with excitement; the pick has struck real opal. This is where the prospector must take his hammer and set to work chipping away from around the promising area. It may turn out to be nothing more than colorless glass, though far more rarely the hammer may suddenly uncover a bit of living color whose flashing brilliance stands out weirdly in the wall of drab-gray rock. The unfortunate part of detecting opals in this way is that the pick either has sounded a false alarm in striking valueless material or else—and almost equally unfortunate—the pick has **broken** a gem of value. It begins to look as if the opal-digger can't win either way.

In a week's time my partner and I had opened up a huge cut in the hillside. This, strange to say, was no more than the limits of the former workings. It was explained to us that high-graders had paid a recent visit here, for it was their custom when finishing up the job to cave down all the wall-rock in sight. This not only served to conceal the nefarious work but also was a polite way of leaving behind a visiting card. This fact, though filling us with dreams of vengeance, gave my partner and me renewed hope. We figured that high-graders would not be likely to waste their time on a barren claim. Spurred on by such optimisms and by the energetic cries of the owner we dug deeper and deeper; mucked harder and harder. All to no avail. Except for one tiny gem found at the beginning, the claim proved as barren of opal as we were now of perspiration.

Another month saw us quarry out mighty pits in two other claims. These also had been visited by high-graders apparently, for the amount of preliminary mucking was appalling. And the opals, strangely enough, again failed to show themselves to us. We picked up all sorts of opalized wood, but the opal was never more than colorless or pale-bluish glass. By this time our admiration was wholly with the high-graders. What pluck and perseverance they must have had to go to all the trouble of working illegally at claims which yielded nothing when legally worked!

(*Photo by the Author*)

Trying to dig in far enough to get some shade

In the meantime the work of the others in the party had been much as ours, conspicuous by lack of success. Of late they had become obsessed with the notion of digging a tunnel right into the center of a hill from which much precious opal already had been taken. Two interesting developments arose from this: one was the occupation of looking for timber for the tunnel in an entirely unforested region (this was finally solved by 'swiping' fenceposts); the other was the diverting game of playing hide-and-seek with the tunnel roof. This latter had the habit of caving at frequent and unexepected intervals, and anyone who was in the tunnel at the time had the fun of trying to get out before the roof came down. This tunnel obsession exerted such an effect upon our fun-loving comrades, that when they were through proving that the center of the hill was as barren as the outside they decided to give up the work altogether. It was evident that they had become spoiled for work of a more serious nature.

One day the owner, whom we had recently noticed wandering hither and thither in an aimless fashion, came stumbling down the hillside to my partner and me as we mucked away at claim No. 4. "Boys, we've struck it rich!" Well, well, this was indeed welcome news. In an hour we had transferred picks, shovels, wheelbarrow, and ourselves to the roughest and steepest little bit of hillside in the whole region. The owner had picked up a great deal of 'color' (that is, tiny fragments of gemmy opal) over the surface of this limited area, and for once they did seem to indicate rich opal-bearing ground underneath. We applied pick and shovel with real enthusiasm as we began to take out some small gems of good quality and a few slender, completely-opalized limbs which showed brilliant fire in patches of the cross-section. Every bit of precious material received a bath in glycerine as soon as exposed; then was wrapped up tenderly in layers of soft paper and kept in the coolest place possible. The glycerine was supposed to keep the opal from cracking (an unfortunate characteristic of many of the gems from Virgin Valley), but our experience proved it to be utterly worthless in this connection. Much is written and more said about the different curative processes that have been carried out in treating the Virgin Valley opals. We ourselves found that the only way to discourage cracking at all was to keep the opals from ever seeing the desert sunlight. Few prospectors can conquer the impulse of taking one look out in the sun to estimate the full glory of a newly-found gem. They fail to realize that a mere second's exposure to this super-intense heat and glare is sufficient of a change from the cool, underground resting-place in the ash to exert the most destructive effects upon the sensitivity of the opal. If your opal is worth saving it will show enough fire in the shade to convince you of its value. Keep it wrapped up in a cool place until you take it to a milder climate. Then if it's cracked, be philosophical and decide that there was nothing under heaven which could have made it otherwise.

Dr. H. C. Dake, Photo.

A characteristic opal mine. Virgin Valley, Nevada. Most of the "mines" are shallow diggings of this type.

But even this most promising find soon began to fail us. The further in we dug, the fewer the opals. When our quarry had attained vast dimensions we were finding nothing of value. One day I awoke from a daydream just in time to see my partner run a remarkable race with about fifty tons of wall-rock which he had cleverly undermined. He won the race with several inches to spare, but something in the expression of his face convinced me that our work in Virgin Valley was drawing to a close. I was right; the serious work was over.

We left the valley not entirely empty-handed after all. In the midst of gentler climates and less arduous circumstances we commenced to think back over our experiences in truly illuminating retrospect. It had been tremendous fun, really, digging for treasures which existed chiefly in our imaginations; and the life and hard work in that severest of climates had not failed to help us physically. We had made true friends of the Basques who inhabit the valley, and found them more generous and hospitable than most American natives of the soil. Best of all, we had heard told and retold those amazing legends which belong uniquely to that region—which so often are meaningless when related elsewhere. And now even the sharp and ugly lines of desert landscape begin to soften with the enchanted view of distance and merge into a dim picture of weird and wonderful scenic beauty. Some day we're going to go back there and dig out a real opal!

(*Photo by the Author*)

Almost as many prospect-holes as opals.

Collector's Kinks

Collectors are cordially invited to submit notes from their experiences and so make this department of interest to all.

I have noticed in the booklet "How to Collect Minerals" that clear lacquer is recommended for preserving certain types of minerals. I use something on this order myself but believe that clear white shellac is superior for the following reason: the lacquer requires a special solvent to remove it and such solvents may injure delicate minerals if it is necessary to remove the coating. Shellac can be removed very easily by soaking the mineral in alcohol for a few minutes and brushing with a soft bristle brush. Small amounts of alcohol will not injure such minerals as sylvite, colemanite, etc., that need to be protected with an artificial coating. The white shellac may be purchased at Woolworth's in small bottles, each containing enough to last for several months. Use a small glue brush for applying the shellac on a mineral. Rather than sealing those minerals affected by moisture in glass bottles, if such minerals are given a light coating of shellac, they may be placed in the trays with no other protection and may be handled safely without the moisture of the hands affecting them.

C. W. REITSCH,
Denver, Colo.

Mineral Oddities

Basanite, Lydian Stone, and Touchstone are the names for a velvety-black variety of quartz. With this stone it is possible to detect counterfeit coins. All good coins of copper, nickel, silver and gold leave a bright shining mark or line (streak) when their edges are rubbed across the smooth face of the touchstone. A counterfeit coin, composed of base metal, would leave a dull streak or would become dull on being moistened and rubbed. To note how these streaks react, rub across the smooth face of a touchstone, a copper, a nickel, and a silver coin and any other metallic substance as iron (point of knife or nail), aluminum (wire or spoon), lead, etc. Have these streaks run in parallel lines and remember each. Note how they compare with one another. Moisten them all and then rub them well with your thumb or finger. The streaks made by copper, nickel and silver will remain bright and shining; the others will fade, become dull and almost disappear.

MINERALOGY QUIZ

(Answers on Page 151)

1. Who wrote "Minerals of New York City and Its Environs?"
2. Of what noted club is he a member?
3. What is the true name for false topaz? For smoky topaz?
4. What is the chief ore of copper? Of tin? Of aluminum?
5. What is the gem state of Brazil?
6. What is bloodstone and from what country do the finest specimens come?
7. Can bloodstone be used as a gem?

Diamond Finds in the United States

By EUGENE W. BLANK, *Scientific Editor "Rocks and Minerals"*
Colgate-Palmolive-Peet Company, Jersey City, N. J.

FOREWORD

Several years ago the writer published in this magazine a paper on diamonds found in the United States[1] At the time not much information was available regarding this fascinating subject and the writer continued for several years, with but little success, to increase his knowledge of diamond finds and strikes in this country. Lately, with the assistance and sanction of the editor of "ROCKS and MINERALS," Mr. Peter Zodac, he has endeavored to make a complete survey of the diamonds native to the United States. To this end letters were sent to all the State Geologists of the various states and to all those who were regarded as likely to have knowledge of diamond discoveries in their locality. In addition the scientific literaturre was thoroughly reviewed. Much interesting information has been amassed. With the publication of this report the writer now regards his earlier paper as inadequate and youthful. Since it has been found necessary in many instances to decide between the conflicting opinions of various authors the writer is alone responsible for any errors occurring in this work.

The author finds himself indebted to a number of friends for information and suggestions. To all of these he would express his most sincere thanks. Formal acknowledgment of their help is given in the bibliography. Numerous references to original papers have been given throughout.

INTRODUCTION

The diamond has been known from the most ancient of times but the extreme brilliancy of the gem was unknown to the ancients since they had no means of cutting and polishing the stone. Consequently the diamond, as we know it, is not yet fifty years of age[2]. The inability of the ancients to cut the stone rendered it less desirable from their point of view than the other stones known to them and as late as the sixteenth century it was regarded as inferior to rubies and emeralds. It is not necessary at this point to describe all the physical and chemical properties of the diamond. They are given thoroughly and at length in a great number of books and papers[3] The bibliography of the diamond is enormous and it is not within the scope of this paper to present it at length. It suffices to give a short resume of the most striking characteristics of the diamond among which it is of interest to note that the hardness and typical dullness of the diamond in its natural state, which, as we have seen was the only aspect of the stone known to the ancients, renders the detection of the stone very difficult by an inexperienced person. It is probable that very few of the doubtless numerous diamonds lying in the glacial drift of the northern states of this country have been discovered since the first impulse on seeing a

[1]Blank, "Diamonds in the United States," Rocks and Minerals Vol. 4, 37 (1929).

[2]Cattelle, "The Diamond," New York (1911).

[3]Under this reference is included a brief comprehensive general bibliography of the diamond not to be regarded, however, as a complete list of all the papers, books, etc., extant on the subject. The diamond is characterized by a literature that is a veritable paper pyramid in magnitude!

Streeter, "Great Diamonds of the World," London (1892).
Williams, "The Diamond Mines of South Africa," New York (1905).
Murray, "Memoir on the Diamond," London (1839).
Jacobs and Chatrian, "Monographie du diamant," Paris (1884).
Emanuel, "Diamonds and Precious Stones," London (1865).
Crookes, "Diamonds," Smithsonian Report, p. 219 (1898).
Boutan, "Le Diamant," Paris (1886). Contains a full bibliography.
Wodiska, "A Book of Precious Stones," New York (1909).
Farrington, "Famous Diamonds," Geology Leaflet 10, Field Museum of Natural History, Chicago (1929).
Cattelle, "The Diamond," New York (1911).
Blank, "The Synthesis of the Diamond," Rocks and Minerals, Vol. 7, 143 (1932).
Kraus and Holden, "Gems and Gem Materials," New York (1925).
Sutton, "Diamond," New York (1928).

natural diamond is to pass it by without a second glance. As a matter of fact, so difficult is it to describe the natural diamond to one who has never seen it, the Geological Survey many years ago was interested in distributing rings with mounted uncut diamonds in them to be worn by people who might come in contact with rough diamonds and thus be able to identify their find by comparison.

Secondly, it is important to note that the hardness of the diamond renders it a great traveler. It is of significance on finding a diamond to try and ascertain the original locality from which it has been derived by erosion and mechanical agencies such as water.

The diamond crystallizes in the cubic system, the more common crystal forms being the octahedron and rhombic dodecahedron. The cube and some of the more complex forms are less frequently observed. The African stones for the most part are found as octahedrons. The stray diamonds occasionally picked up in the state of Wisconsin are generally dodecahedrons. Most of the Wisconsin diamonds have either twelve or forty-eight faces. Diamonds usually show some distinct faces or form since they are too hard to be worn smooth like common pebbles even though they may have been transported long distances in the course of their wandering. Diamond crystals are often distorted and may show twinning. Contact twins according to the spinel law are frequent.

The diamond has a perfect octahedral cleavage. The fracture is conchoidal. The mineral has a hardness of ten. The most common colors are white, yellow and brown. Red or blue stones are rare; green stones are more frequently found. For the most part the colors are pale. Gray, black and opalescent stones are sometimes found. Stones with a pure white, green, red or blue tint are the most valuable. The so-called **off color** diamonds have a tinge of yellow or brown in them. The cause of the color of diamonds is ascribed to metallic oxides of various sorts.

The diamond varies from transparent to opaque. Its luster in the uncut state is dull or greasy. Some stones phosphoresce or fluoresce after exposure to light or ultra-violet rays. This property is often used to distinguish it from quartz, topaz or glass. The diamond is cold to the touch since it is an excellent conductor of heat. The diamond is pure carbon and when burnt in oxygen yields carbon dioxide.

The diamond has always been more or less of a paradox to mineralogist and philosopher alike. The philosopher Steffans is credited with the dictum that, "Diamond is quartz which has arrived at self-consciousness," and an eminent geologist has parodied this metaphysical definition, saying, "Quartz is diamond which has become insane"[4]

Diamond Localities In The United States

Diamonds are rather widely distributed in the United States when one considers all the scattered points at which they have been found[5 6] Single stones have been picked up at long intervals along the eastern slopes of the Apppalachians in North and South Carolina, Georgia and Virginia. A comparatively large number of stones of considerable size have been found in the Great Lakes region. California is another noted locality the diamonds being found for the most part in the gold placer and platinum mines, most of them in the neighborhood of Fiddletown and Volcano in Amador County. Diamonds were first found in the United States in the state of California, adjacent to the watersheds of the San Joaquin and Sacramento rivers.

Diamonds of meteoric origin have been found in the iron of the Canyon Diablo meteorite in Arizona.

The most famous locality for diamonds in the United States is the well-known Arkansas diamond field. This was discovered on August 1, 1906, when John M. Huddleston picked up two stones near the mouth of Prairie Creek, two and one-half miles southeast of the little town of Murfreesboro, Pike County, Arkansas. Most of the diamonds have been found in an ex-

[4]Crookes, "Diamonds," Smithsonian Report, p. 219 (1898).

[5]According to Sutton, "Diamond," New York (1928), "Diamond" and not "Diamonds," should be used in reference to the mineral. "The former is the recognized mineralogical name; the plural form, strictly speaking, is a trade name applicable in chief to the cut stones." This distinction has not been adhered to in the preparation of this paper.

[6]Ball, "Diamonds; large number of localities in which they have been found," Eng. and Mining J., Vol. 109, 1202 (1920).

posure of peridotite rock which is similar in character and mode of occurrence to that of South Africa.

Summarizing we find that diamonds are found in the United States in three fairly well defined regions. These are (1) the Pacific coast, chiefly along the western base of the Sierra Nevada; in California associated with gold in the gravels and in Oregon and Washington reported in the black sands; (2) along the line of the terminal moraine of the ancient ice sheet in Wisconsin, Michigan, Indiana and Ohio, these stones, "emigrant diamonds" as they are usually called, have been transported from an undiscovered source, presumably somewhere in Canada and (3) in the Atlantic states from Virginia to Alabama, chiefly in the Piedmont region along the eastern base of the Appalachian Mountain. These stones have been derived from erosion of the adjacent mountain ranges but the original source of the stones has never been discovered. It may be said that all the diamonds found in the United States, with the exception of those from the Arkansas fields, have been found accidently or incident to the mining of some other material.

Diamonds in North Carolina[7]

According to H. J. Bryson, State Geologist of North Carolina, up to the present time, there are about ten authentic occurrences of diamonds in North Carolina besides several reported discoveries that are not entirely reliable[8]. The unreliable reports were probably quartz crystals which were thought to be diamonds.

According to Bryson, "The first specimen of diamond, in order of time, was found in 1843 by Dr. F. M. Stephenson, at the ford of Brindle Town Creek in Burke County. This particular specimen was an octahedral crystal which was valued at $100.00. We have no particulars of it on record. Another specimen was found in the same neighborhood by Dr. F. W. Featherstonhaugh, but there seems to be no account of its character preserved. The next authentic discovery was in 1845 when a distorted octahedron, with curved faces, clear and flawless, though tinged with yellow, was found in the gold washings in Rutherford County. This particular specimen weighed 1⅛ carats and later became the property of the late General T. L. Clingman, of Asheville. Prof. C. U. Shepard described it as well as the materials in which it was found in the American Journal of Science, Vol. 2, Page 253, September, 1846. He was under the impression that itacolumite was the matrix, as in Brazil. The next reported discovery was in 1852, in Lincoln County, by Dr. C. L. Hunter. It was described as an elongated octahedron of delicate greenish tint, transparent and weighed about one-half carat. In the same year, a white crystal of one carat was found in Mecklenburg County. Soon after this two other beautiful octahedron diamonds were reported by Prof. F. A. Genth as obtained at the Portis mine, in Franklin County.

"Two discoveries are recorded in McDowell County, one of two or three small crystals found at the headwaters of Muddy Creek and the other a fine stone picked up at Dysortville, in 1886. This fine specimen was a distorted and twinned hexoctahedron of 4⅛ carats transparent with a grayish-green tint. It was found by the small son of Mr. Grayson Christie, near a spring on the farm of Alfred Bright. A model of this specimen was exhibited at the Paris Exposition in 1889 and the diamond is now in the Tiffany-Morgan collection of the American Museum of Natural History. For several years after this, the small stones left in the sluice boxes at the old gold mines in McDowell County were examined carefully for diamonds.

"In 1877, which was nine years previous, a stone weighing 2⅜ carats was found in the same region by a small boy. It was described as white and lustrous but somewhat flawed, irregular and flattened in form, resembling a bean, with the crystal faces obscure. This specimen was sold for $18.00 and was finaly sent to New York where it was cut into small gems and its identity lost. In 1893, in Cleveland County, near Kings Mountain, a small stone of a bright canary yellow, weighing three-fourth carat, was found.

[7]Pratt, "Gems and Gem Minerals of North Carolina," The Am. Mineralogist Vol. 18, 148 (1933).

[8]Private communication consisting chiefly of extracts from Bulletin No. 12, "History of the Gems Found in North Carolina" which is now out of print.

"This list includes all of the authentic diamonds found in North Carolina. All of these localities are situated in practically the same section of the State which may be described as the upper Piedmont section. The rocks of this area are chiefly Archeozoic, masses and schists intruded occasionally with pegmatites and often containing lenses of graphite. The peridotite belt of this State is considerably farther west and none of the peridotite dikes occur in this immediate vicinity. However, there is a belt of itacolumite, the so-called flexible sandstone, running through much of this region. This has frequently been supposed to be the matrix of diamond crystals. The presence of this peculiar rock and the occasional discovery of diamonds in adjacent districts have led to the idea that the itacolumite belt might prove to be a valuable diamantiferous region. It seems that the diamonds in this State were not produced contemporary with the itacolumite but came from the older rocks and were redeposited with the sands resulting from the reduction of these. The diamonds were interbedded with these and occur over a wide area of surface in the counties of Burke, Rutherford, Lincoln, Mecklenburg and Franklin. The itacolumite is a sort of quartzose mica slate and is found at several localities in the western part of this State."

Relative to the diamond found on the Alfred Bright farm in Dysortville, McDowell County, N. C., Dr. G. F. Kunz says, "Its specific gravity is 3.549-|- and it measures 10 millimeters in length and 7 milimeters in width. This stone being more than an average find, the writer thought it would be of interest to visit the locality, and while there in June, 1887 he fully authenticated all the facts of the finding . . . A number of supposed diamonds, which proved to be zircon or smoky quartz, have been found here before. No trace of garnet, peridotite, or any of the associations of the diamond, were found near the spot. . . . Its value as a gem, not counting any value its American origin may attach to it, would be from about one hundred to one hundred and fifty dollars."[9]

There are no known authentic finds of diamonds in South Carolina, though Catelle includes South Carolina in his list of American localities. According to this authority the gravels from which diamonds have been taken in the Carolinas have resulted from the weathering of the crystalline silicate rocks which make up the surrounding mountains. The gravels contain minerals commonly found with the diamond in various other alluvial deposits such as garnet, zircon, gold, magnetite and anatase and monazite.

Ball[10] says, "It would be strange if scattered diamonds do not occur in South Carolina but the reported finds need confirmation, as certainly do those from Illinois near Ashley; near Syracuse, N. Y.; in Missouri; Yankton, S. D.; Santa Maria River and Philadelphos, Ariz.; Cleveland, Ohio; and San Juan County, Colorado." Of this formidable list of localities the writer was able to verify that of Syracuse, N. Y. (See Miscellaneous Finds of Diamonds to be printed later).

Diamonds in Georgia

The diamonds found in Georgia have for the most part been found in the early placer operations for gold. Stones have been found in the counties of Hall, White, Habersham, Banks, Lumpkin, Dawson, Forsyth, Gwinnett, Cherokee, Clayton, Bartow, Haralson, Carroll, Paulding, Cobb and Twiggs[11]

The first diamond found was reported by Dr. M. F. Stevenson in 1843. The stone was found in Hall county while panning for gold. The source of the stone remains unknown.

Diamonds have been reported from the gravel along Stockeneter Branch at the Glades, 13 miles northeast of Gainesville.

A stone was found during plowing one and a half miles northwest of Morrow Station, Clayton county in 1887. Subsequent search involving the sinking of a shaft and the washing of the disintegrated rock led to no further finds. The rock of the locality is a gray biotite.

A number of diamonds are reported from a locality 11 miles northeast of Macon in Twiggs county.

(To Be Continued)

[9]Kunz, "Diamond from North Carolina," Science Vol. 10, 168 (1887).

[10]See Ref. 6.

[11]McCallie, "Mineral Resources of Georgia," Bulletin No. 23, p. 118, Atlanta (1926).

Recent "Finds" of Interest

Rocks and Minerals would be pleased to have its readers submit short notes on their "finds" to this department.

Mountain leather and mountain paper, two unique varieties of amphibole, were recently found outcropping in a limestone quarry at Patterson, N. Y. by Emmet Doherty and Peter Zodac of Peekskill, N. Y.

Gibbsite, a mineral rarely met with in collections, was recently found at an old abandoned mine, near Richmond Furnace, Mass., by Carl Klein of Hudson, N. Y.

Beautiful pinkish calcite was recently exposed during the construction of a dam at Brooks Hollow, Bear Mountain Park, Orange County, N. Y. Credit for the discovery is due Robert Bispham, Assistant Curator of Trailside Museum at the Park.

Chares Travis of Peekskill, N. Y., reports a new occurrence for molybdenite in Putnam County, N. Y. The locality is near a new dam built by the crew of a CCC Camp on the Seven Mile Road near Fahnstock Park.

James G. Stephens, of Seattle, Wash., reports the discovery of a deposit of red jasper of excellent quality from which blocks over one foot square could be extracted.

U. S. CIVIL SERVICE OPPORTUNITIES

For those who are interested we are pleased to announce the following open competitive examination to be held in the near future by the U. S. Civil Service Commission:

Metallurgist, $3,800 a year

Applications for the above examination must be on file with the Commission at Washington, D. C., not later than Nov. 8, 1934.

The examination is to fill a vacancy in the Ordnance Bureau, War Department, with headquarters at Rock Island, Ill.

Full information may be obtained from the U. S. Civil Service Commission, Washington, D. C.

MINERALOGY QUIZ—Answers

(Questions on Page 146)

1. James G. Manchester.
2. New York Mineralogical Club.
3. Quartz var. Citrine. Smoky Quartz.
4. Chalcopyrite. Cassiterite. Bauxite.
5. Minas Geraes.
6. Bloodstone is a mixture of two quartz minerals — small spots of red jasper in green plasma. Because the red spots look like drops of blood, the specimen received the name of "bloodstone." It also is named Heliotrope. The finest bloodstones come from India.
7. Yes.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

Of Rocks and Minerals published monthly at Peekskill, N. Y., for October 1st, 1934.

State of New York } ss.
County of Westchester, }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Peter Zodac, who having been duly sworn according to law, deposes and says that he is the Editor and Publisher of Rocks and Minerals and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher Peter Zodac, Peekskill, N. Y.; Editor Peter Zodac, Peekskill, N. Y.; Managing Editor Peter Zodac, Peekskill, N. Y.; Business Manager Peter Zodac, Peekskill, N. Y.

2. That the owner is Peter Zodac, Peekskill, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are none.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also in cases where the stockholders or security holders appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of fthe company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

PETER ZODAC, *Publisher*

Sworn to and subscribed before me this 20th day of Sept., 1934.

(SEAL) SALVATORE T. GAMBINO,
Notary Public.

(My commission expires March, 1935).

Collector's Loose-leaf Mineralogy

By GILBERT HART

R.F.D. Route 3, Piedmont, Ala.

The collector of minerals requires a textbook which differs vastly from that designed for a student. Most existing texts were written for college students who are beginning their study of minerals or who are entering some advanced phase. There are "Elementary" and "Advanced" textbooks and "Optical" and "Petrographic" manuals. But the collector, and also the scientist, needs a catalogue of minerals which will give him a concise description of each species, and exhaustive notes on each variety or questionable occurrence. Furthermore, the catalogue should be complete, and to be complete it must be reissued at frequent intervals to keep abreast with discoveries.

This writer is convinced by his own troubles that the best method for such a "Collector's Mineralogy" is the loose-leaf system. He has abstracted from reference books, from published literature of the original describers and of subsequent investigators, and from any other reliable source all possible data, and has systematized and condensed it upon loose-leaf sheets. These are kept in a filing case arranged according to the accepted classification by natural groups. Each page is available for correction or addition whenever further data is available. New species can be easily inserted in their proper places. The whole scheme is admirably adapted for comparative study of species and for quick reference to any desired type.

A complete catalogue of this type would be of greatest value only to the very advanced collector, or to the professional mineralogist. Those not now interested in all species would be satisfied with a catalogue of, say, the commonest minerals, or those occurring in their own district. Some might wish to arrange their book alphabetically as a dictionary; others might prefer an arrangement to correspond with the specimens in their cabinet.

The writer wonders whether the collectors, senior and junior, would be

interested in such a loose-leaf mineralogy as is outlined, the pages to be after the fashion of the following page. The material is already compiled and condensed for over 500 of the common minerals; and is compiled for every described species through 1930. The varietal material is complete. The cost of issuing the pages as mimeographed sheets would be about 4c a page, say $3.50 for an exhaustive reference text for 100 minerals. This cost would depend largely on the number produced, since the costs of preparation are the most important ones. The estimate is based on 500 copies to be disposed of in the near future. The reverse of these mimeographed sheets would be blank, an excellent place for the collector's personal notes.

The writer would like to hear from any and every one about the possibility of issuing such a catalogue, the probability of sales, and suggestions in any way.

Sample Page of Collector's Loose-leaf Mineralogy

..... (name)

System .....
Class .....
Ax. Rat. .....
Ax. Angles .....
.....
.....
Habit .....
.....
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Structure
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.....
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.....

Pleochroism
.....
.....

Opt. Ax. Pl.
.....

Act. Bis. .....
Dispersion .....
.....

Optical Analomies
.....
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.....
.....

Prism Angle .....
Pyramid Angle .....
Common Forms .....
....
....
....
....
....

Other observed forms
....
....
....
....

Optical Sign .....
Indices ....
mean .....
Biref. .....
2E .....
2V .....
2H .....
.....
.....
.....
.....
.....
.....
.....

Cleavage .....
.....
Parting .....
Fracture .....
.....
Tenacity ....
.....
Hardness, usual .....
limits .....
Specific Gravity
usual .....
limits .....
Luster .....
.....

Color usual .....
....
....
....
Streak .....
Diaphaneity .....
.....

Thermo-electric
.....
Electric .....
.....
Magnetism .....
.....
.....
.....

Chemical Composition .....
Usual impurities .....
Rare important impurities .....
Pyrognostical notes .....
.....
.....
.....

Notes on occurrence, references, etc.
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The Amateur Lapidary

Conducted by J. H. HOWARD*

504 Crescent Ave., Greenville, S. C.

Amateur and professional lapidaries are cordially invited to submit contributions and so make this department of interest to all.

*Author of—*The Working of Semi-Precious Stones.* A practical guide-book written in non-technical language for those who desire to cut and polish semi-precious stones.

Cabochons

By J. H. HOWARD

Since writing in 1931 the booklet "The Working of Semi-Precious Stones" I have continued to experiment and have found that there are many ways in which most operations on gems may be done. In some details I have changed my methods from those advocated in the book above mentioned. If I were to try to mention these as changes from the schemes outlined in the book I am afraid confusion would result. For what I want to say represents in some cases alternates to those methods, in some cases merely clarification of that text, and in still other cases additional information. So if I may be allowed the time and space I want to outline anew the method I am now using for cutting cabochons.

Confirming the old dope, by all means run several in each batch as this eliminates so much changing of wheels and washing of hands and apparatus between operations.

Saw the material into blocks with their dimensions about equal to the size of the desired finished gem. The diamond saw is by far the most satisfactory way to do this.

Now determine which face of the rectangle is to be the base of the gem. Do all work on the bases of the entire batch including the final polish. If the bases are very rough and irregular, grind them flat on a cast iron lap with a paste of water and 100 carbo grains. Follow with FF carbo on cast iron lap. Then with FF carbo on the periphery of a maple wheel. Then polish with a paste of tripoli and water on the periphery of a felt wheel. The bases will need no further polish. Keep the stone moving in all the above operations. This is especially necessary when working on the periphery of wheels. The stone must be kept moving up and down parallel to the direction of rotation of wheel and should be turned 90° in the hands quite often. This is to prevent corrugation. If the upper edge of the stone is allowed to come quite down against the wheel the sharp edge will scrape the abrasive off the wheel. Keeping both the above things in mind it is a good rule to polish 4 ways from the centers of flat stones to the 4 edges. This insures even polish over all the area and at the same time insures against scraping off the abrasive. There are two reasons for completing the bases of the stones before roughing out. First, the stones are so much easier to hold when they are cubical than after they have been rounded on front. Second, with a polished surface it is easier to look into a stone such as an agate and determine the best shape and size for it to properly place such pattern as it may have and to see if there are flaws.

Next rough out the stone. Hold it by hand and grind to shape on a 100-J-J-G5 carbo wheel. This wheel is run wet at a speed of at least 1800 rpm and has a diameter of 10" and is ¾" thick. Many users recommend a softer

wheel because they cut the stone faster. This is for each man to decide for himself for while the softer wheel does cut faster it also wears faster and must be trued up more often. If you want the softer, faster cutting wheel specify 100-L instead of 100-J.

The stones are next to be cemented onto the end of lapsticks. Have two shapes and several sizes of each shape of sticks. One series should be round and with sizes varying from just under the size of the largest round stone you will cut, to just under the size of the smallest stone you will cut. The other series should be oblong and with sizes graded as mentioned for the round ones. The round ones may be whittled from squares made by splitting large blocks or by splitting any lumber that you may have about. The oblong ones may be made of shingles or laths or from thin boards such as packing cases are made of. This matter of having the sticks the right size is quite important. If they are too large, not enough cement can be gotten around them without overhanging the edges of the stone and they are almost sure to give trouble. If they are too small the difficulty can be remedied by banking a heavy mass of cement around them but this is a lot of trouble and is likely to be neglected or carelessly done and again we will have trouble. Where several stones are to be anchored at the same time it pays (on the initial job) to go to the kitchen stove to do it. Melt ordinary chasers cement (sealing wax is probably equally good) and keep it on the stove at just above the melting point. Warm the sticks. Dip the end of each stick in the pan of cement. Hold and turn the stick in such a way that the cement sets up in a fairly symmetrical mass. Lay each stick aside to cool. After the entire batch of sticks has been given this treatment, begin with the first taken out and dip each stick a second time to increase the amount of cement adhering to its point. This second dipping will probably make them about the right size.

The operation can now be transferred to the basement. True, in as much as you are already in the kitchen you might as well finish the job there. But the work you have just done will never have to be done again, as these sticks will be used over and over. And it will probably be more convenient in the future to anchor the stones to the sticks in the shop so I am going to describe only that method. Match up each stone with a stick that is the right size for it and lay them down together so they will not be mixed up. Light the alcohol lamp. Hold the stone with a pair of pliers in the right hand with its base outward and flush with the ends of the jaws of the pliers. Hold the stone in the flame until it is warm. At the same time be holding in the flame with the left hand a stick of shellac. They should each be brought to its proper temperature at about the same time. As the shellac begins to melt wipe it across the back of the stone. A film of shellac will adhere to the stone. Keeping the stone warm, lay down the shellac and pick up the lapstick. Hold the wad of cement in the flame until it begins to melt, turing it constantly to keep the cement in shape and also to keep it from dripping off if it gets too hot. Then stick the stone onto the wad of cement and press the two firmly together as they both cool. When the cooling has progressed far enough take the pliers off the stone, and with the wet fingers turn the stone into proper position with its base at right angles to the axis of the stick and with its center coinciding with the center of the end of the stick and mould the cement up around the base of the stone until the base is almost or quite covered. After the cement is cold cut away with a knife any surplus that overhangs the edges of the base or that has gotten on the face of the stone. If the stick is nearly as large as the stone and if the stone and the cement are both warm enough when they are stuck togegther, the stone will very seldom break loose unless it is suddenly chilled. Don't ever plunge into cold water a stone on which you are working. It is quite likely to come loose. Keep a vessel of warm water for washing the stones between operations and for inspections. I have given considerable time to this matter of cementing the stones on to the sticks because it is easy to do it right if one knows how and if it is not done right they will come loose at an annoying rate and not only that but some may be thrown away and lost and some may be thrown and broken.

The next job is to smooth the rough cut considerably on a second carbo wheel. This is a 220-K-G4 wheel 6" x 1" running about 1000 rpm. Grind lightly over all the surface, keeping the stone moving rapidly and in a symmetrical manner so as to not only grind out roughness left by the coarser wheel but also to give the stone its correct, final shape. Examine it frequently. This is a wet grind and the stone must be wiped dry for each inspection as the true condition of the surface cannot be seen through a film of water. Keep a towel hanging from the ceiling at a point convenient to the hands and just to the right of your working position. This and all following examinations must be made with a magnifier. A good magnifier should be a double lens with a magnification of about 10. Be sure before this operation is stopped that you have not only ground out all the rough places but that the stone has the wanted shape. This is the last opportunity to cut fast.

The smoothing operation is now continued with the internal grinder with a paste of FF carbo and water. The internal grinder is very efficient but it may be dispensed with and a flat wood wheel with a series of grooves turned in its side may be used instead. In either case the wheel should be made of maple or similar hard wood and its periphery should be turned true. It is usually found that certain parts of the stone are hard to get at with either the internal grinder or the grooves on the side of the wheel. For such cases daub some paste on the periphery of the wheel and do such grinding there. Do not neglect or slight this operation. Continue it until you are dead sure there are no rough places nor deep scatches left. Remember that you can remove now such spots in one minute as will take 10 minutes of the next operation.

We will call the next step the "first polish." Use a 6" or 8" x 1" felt wheel of the hardest grade. Reinforce the sides with metal or wood discs extending to within ⅛" of the edge of the wheel and drawn up tight with bolts through the wheel. The polishing is to be done on the periphery of the wheel and if the sides are not reinforced the wheel will "give" under the heavy pressure of the stones and will get out of shape.

The abrasive is a paste of powdered tripoli and water mixed rather thick. Daub the wheel well with the paste, slow the speed down to about 350 rpm, and ride the stone hard against the wheel. The amount of pressure seems to be all important as relates to speed of cutting. Lack of heavy pressure cannot be atoned for by speeding up the wheel and heavy pressure applied on a wheel at higher speed heats the stone too rapidly. Therefore the low rpm. When stone is perfectly smooth and seems to have a fairly high polish all over, change to a similar wheel with paste of tin oxide and water and put on the final polish.

When this is done dip the stone in cold water. insert a knife blade between the stone and the cement and stone will come loose but with some cement adhering to it. Soak for several minutes in alcohol or acetone and wash clean in the soaking medium. Acetone is much faster than alcohol but costs considerably more and since one has to have alcohol anyway for the lamp, I use it also for the soaking.

If the stone is weak in structure or is cracked it might break if forced loose from the cement. In such cases warm the stone and cement over the lamp, remove the stone and scrape the surplus off with a knife while stone is still warm, then soak as described above.

At the "first polish" there are two roads we may take. One has already been described. If you feel like investing the price of an extra felt wheel, and are working material as hard as agate, I would suggest the omission of the "first polish" as described and the substitution of two operations. Use the same kind of felt wheel and the same speed. On the first one use the tripoli but add to it about 10% by volume of 600 carborundum powder. On the second one use No. 0 pumice stone. Then finish up with tin oxide as before. The time required for the two operations is approximately the same as was taken for the one operation outlined, but I believe the two operations give a better job and leave less work to be done by the tin oxide.

I have recommended maple wheels because, while they leave deeper scratches than is left by the poplar, they do not wear out of true so rapidly.